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Short Communication

Growth response of crossbred kids reared under pasture system to pre-weaning supplementation in temperate region

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Abstract

This experiment was conducted on crossbred (Boer x Bakarwal) goat kids supplemented with concentrate to study their growth performance, haematological parameters and the economics of rearing reared under pasture system in the temperate region. Eighteen goat kids (aged 40 to 55 days) were divided into three groups: group-I (control), kids were kept along with doe without supplementation, group-II, kids were kept along with doe + 50 g concentrate supplementation/ day/kid and group-III, kids were kept along with doe + 100 g concentrate supplementation/day/kid and supplementation was given for a period of two months during the pre-weaning stage. Final body weight of kids supplemented with 100 g of concentrate was significantly ($p<0.05$) increased compared to non-supplemented kids. Average daily gain (g/kid/day) and overall body weight gain (kg) were highest in the kids supplemented with 100 g of concentrate per kid compared to other groups. There was a similar Hb and PVC among different treatment groups. Considering the control group as break even feed investment, a net profit of Rs. 222, and Rs. 55 were obtained in groups supplemented with 100 g and 50 g of concentrate per kid, respectively.

Key words: Crossbred kids, Growth**,** Pasture system, Pre-weaning, Supplementation, Temperate

Highlight

- Pre-weaning concentrate supplementation had a positive effect on improved growth performance of Boer x Bakarwal crossbred kids reared under spring pasture in the temperate region.
- Considering the non-supplemented group as break even feed investment, concentrate supplemented group had greater economic returns.

Livestock rearing plays an important role in the economy of the rural population in Jammu and Kashmir. The state is ideally suited for rearing sheep and goats owing to its abundant rich alpine pastures and high demand for mutton/chevon. The growth traits of livestock are affected by both genetic and non-genetic factors. Among non-genetic factors, one of the important factors is the quality and quantity of feed. Birth weight and early growth rate of kids provide a stage upon which the future performance of kids is built (Otaru *et al.*, 2020). During the pre-weaning age, kids have a faster growth rate which is not met by decreasing milk production from does which are kept only on the pasture system (Adenaike and Bemji, 2011). Moreover, milk production in goat reaches peaks within 2-3 weeks after kidding and then declines rapidly to a low level by 8-10 weeks after kidding, requiring concentrate supplementation of kids for their proper growth (Htoo *et al.*, 2015). Studies have shown that concentrate supplementation/creep feeding increased pre-weaning weight gain, especially

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for kids reared when the dam's milk yield is low, twin or triplet, and kids will reach early target market weights, thus increasing net profit for the farmer (Goetsch *et al.*, 2011; Bharathy *et al.*, 2020). In the temperate region of Jammu and Kashmir, kidding occurs during the winter season when there is a shortage of feed and fodder as there is limited grazing availability. So, it is necessary to supplement concentrate to the kids during the pre-weaning stage. Therefore, the present study was conducted to investigate the effect of pre-weaning supplementation of concentrate in Boer cross local kids on their growth performance, haematological parameters and the economics of rearing under the pasture system in the temperate region.

The present experiment was carried out at Mountain Research Center for Sheep and Goat, Shuhama, SKUAST-Kashmir from March to May 2019. A total of eighteen Boer x Bakarwal goat kids aged between 40 to 55 days were randomly allocated to three groups with six kids in each group for a pre-weaning period of two months reared under a pasture system in the temperate region. Each group had an equal number of single-born male and female kids. Group-I (control) kids were kept along with doe (suckling) without concentrate supplementation. In group-II, kids were kept along with doe (suckling) + 50 g concentrate supplementation/day/kid and in group-III, kids were kept along with doe (suckling) + 100 g concentrate supplementation/day/kid. Dams and kids were kept together throughout the day time only in all the groups. Concentrate feeding of group II and III kids were done once in early morning in groups having composition as shown in Table 1.

Performances of kids were assessed based on weekly body weight, overall body weight gain, ADG and growth rate %. Weekly body weights of kids were recorded using a digital hanging weigh balance in the early morning. Growth rate percentage was calculated as GR % = (Total body weight gain/Initial body weight) x 100. Blood samples (10 mL) were collected by jugular venipuncture into vacationer tubes with EDTA anticoagulant at the start and end of the trial in the early morning. These samples were analyzed for Hb concentration (g/dL) and packed cell volume (%) (Weiss and Wardrop, 2010). Comparative economics of concentrate supplementation of the kids was also calculated.

Data obtained were presented as mean ± standard deviation and analyzed using one-way ANOVA, as per Snedecor and Cochran (1994). Differences between means were tested for statistical significance at $P<0.05$ (SPSS, 2007).

There was a significant ($p<0.05$) increase in final body weight (8^{th} week) in group III as compared to group I (control), as shown in Table 2. But there was no difference between group II and group I (control). Moreover, there was no difference among the different treatment groups from 1^{st} to 7^{th} week of concentrate supplementation. There was a significant ($p<0.05$) difference in average daily gain (g/kid/day), overall body weight gain (kg) and growth rate percent among different treatment groups. The highest average daily gain as 96.96±0.67 g/kid/day, overall body weight gain as 5.81±0.04 kg and growth rate as 84.46±6.52 percent was observed in group III, while lowest average daily gain as 66.00±0.47 g/kid/day, overall body weight gain as 3.96±0.02 kg and

Table 1. Ingredient composition of concentrate fed to Boer x Bakarwal crossbred kids

Sl No	Name of feed ingredient	Percentage
1	Crushed Maize	40
2	Soybean	27
3	Wheat bran	25
4	Molasses	5
5	Mineral mixture	2
6	Salt	1

Table 2. Mean (±SE) of different growth parameters of different concentrate supplemented Boer x Bakarwal crossbred kids

Weekly body weight (kg)	Different treatment		
	Group I (Control)	Group II	Group III
Initial	7.18±0.47 (6)	7.25±0.58 (6)	7.18±0.47 (6)
1st	7.51±0.49 (6)	7.56±0.57 (6)	7.50±0.48 (6)
2nd	7.88±0.50 (6)	7.98±0.56 (6)	7.84±0.59 (5)
3rd	8.10±0.62 (5)	8.46±0.54 (6)	8.40±0.62 (5)
4th	8.50±0.64 (5)	9.00±0.52 (6)	9.12±0.62 (5)
5th	8.98±0.65 (5)	9.60±0.51 (6)	9.94±0.62 (5)
6th	9.58±0.62 (5)	10.25±0.51 (6)	10.82±0.62 (5)
7th	10.24±0.56 (5)	11.00±0.52 (6)	11.78±0.60 (5)
8th	10.94 ± 0.52^{b} (5)	11.88 ± 0.55^{ab} (6)	12.87 ± 0.57^{a} (5)
Average daily gain (g/kid/day)	66.00 ± 0.47^{c} (5)	77.13 ± 0.80^{b} (6)	96.96 ± 0.67^{a} (5)
Overall body weight gain (kg)	3.96 ± 0.02^{c} (5)	4.62 ± 0.04^{b} (6)	5.81 ± 0.04^{a} (5)
Growth rate (%)	57.99 ± 4.23^{b} (5)	66.06 ± 5.62^{ab} (6)	84.46 ± 6.52^{a} (5)

Mean showing different superscripts in a row differ significantly at $p<0.05$. Number in parenthesis (n) depicts the number of animals.

Table 3. Mean (±SE) of haematological parameters of different concentrate supplemented Boer x Bakarwal crossbred kids

Treatments	Haematological parameters			
	Hb (g/dL)		PCV (%)	
	Initial	Final	Initial	Final
Group I (Control)	9.53±0.26 (6)	9.68±0.40 (5)	39.17±0.54 (6)	39.60±0.74 (5)
Group II	9.65±0. 25(6)	9.75±0.28(6)	39.50±0.50 (6)	39.33±0.84 (6)
Group III	9.82±0. 29 (6)	9.96±0. 30 (5)	39.17±0.90 (6)	39.80±0.80 (5)

Number in parenthesis (n) depicts the number of kids.

Table 4. Comparative economics of different concentrate supplemented Boer x Bakarwal crossbred kids

Treatments	Input cost A	Output		Profit
	Feeding cost (Rs.)	Gain in body weight compare to control (kg)	Total output cost B (Rs.)	B-A (Rs.)
Group I (Control)	0	0	0	0
Group II	0.05x25x60=75	0.65	0.65x200=130	55
Group III	0.10x25x60=150	1.86	1.86x200=372	222

Note: Cost of concentrate is taken as Rs. 25/kg, and sale price of lives weight is taken as Rs. 200/kg

growth rate as 57.99±4.23 percent was observed in group I (control). Also, there was a non-significant difference in haemoglobin (g/dL) and packed blood cell volume (%) of different concentrate supplementation groups (Table 3). There was a net profit of Rs. 222 and Rs. 55 obtained in group III and group II, respectively, compared to the control group at the end of the study period (Table 4).

Similar results were observed by Hayes

et al. (2019), who reported that goat kids fed with creep feed had higher (≤0.05) pre-weaning average daily weight gain and weaning weights than kids not fed creep feed. Similarly, Htoo *et al*. (2015) reported that total weight gain, average daily gain and weaning weight were significantly higher ($p<0.05$) in Boer crossbred kids fed with creep feed than in kids only had access to their dams' milk. Yadav *et al.* (2010) reported significantly higher average daily weight gain and live weights in grazing goat kids with concentrate and mineral mixture supplementation than without supplemented group. It was also suggested to supplement concentrates and mineral mixture in grazing goat kids in order to increase the benefit of goat's farmers. Yiakoulaki *et al.* (2014) showed that supplementation of different pastures during weaning increase ADG of kids. Goetsch *et al.* (2002) reported that pre-weaning feeding of concentrate-based supplementation in Boer x Spanish kids had improved early post-weaning growth as compared to the non-supplementation group. The present study is in accordance with the finding of Hayes, 2018, who reported that creep feeding did not affect haematological parameters among single-raised kids.

Thus, it was concluded that there was a significant ($p<0.05$) increase in final body weight in kids supplemented with 100 g of concentrate compared to non-supplemented kids. Average daily gain (g/kid/day) and overall body weight gain (kg) were highest in kids supplemented with 100 g of concentrate compared to other kids of other groups. There was a non-significant difference in Hb and PVC among different treatments. Considering the control group as break even feed investment, a net profit of Rs. 222 and Rs. 55 were obtained in groups supplemented with 100 g and 50 g of concentrate per kid, respectively. It is recommended that kids should be supplemented with concentrate @ 100 g/kid/day during the pre-weaning period reared under pasture system in temperate region.

Conflict of Interest: Authors have no conflict of interest in this study.

Author's contribution: RAP: Involved in research work, preparing original draft; HMK: Engaged in conceptualization of the idea; MA: Helped in the supervision of trial and editing; IAB: Engaged in final editing; AAS: Helped in statistical analyses and methodology.

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